

## Drawings and Submittals (Contest 3 Details)

Teams must send drawings and submittals for the Project to the Organizers on three separate occasions. Ideally, the drawings and submittals are continual works-in-progress that culminate in the as-built set, which is judged as part of Contest 3: Documentation. The Organizers use the drawings and submittals to determine constructability, system operational parameters and requirements, Rules and Regulations compliance, and code and design standards compliance. The following is a brief description of the three required sets of drawings and submittals.

1. **Design Development Drawings and Submittals (due June 15, 2004):** The following description of the design development project stage is taken directly from *The Architect's Handbook of Professional Practice: Student Edition*:

“Decisions made in schematic design are worked out at a more detailed level to minimize the possibility of major modifications being needed during the development of construction contract documents. In design development the design team works out a clear, coordinated description of all aspects of the design, including architectural, mechanical, electrical, plumbing, and fire protection systems. Deliverables are similar to those of schematic design but are more detailed. They include drawings and specifications, an updated cost estimate, and, if required, the preparation of estimated schedules for construction. Again, written client approval provides a basis for subsequent work. The approved design development documents provide the basis for the construction documents increment, which sets forth in detail the requirements for construction.”

The Organizers will evaluate the design development set to determine whether a team will receive conditional approval (analogous to the statement above, “written client approval provides a basis for subsequent work”). The Organizers will thoroughly review the information contained in this set and identify any deficiencies and requirements for final approval.

2. **Construction Drawings and Submittals (due February 8, 2005):** The following description of the construction documents project phase is taken directly from *The Architect's Handbook of Professional Practice: Student Edition*:

“Once a design has been developed and approved, the architect prepares the drawings and specifications that set forth the requirements for construction. The development of the construction documents is an extension of the design process. Decisions on details, materials, products, and finishes all serve to reinforce the design concept—and begin the process of translating the concept into reality.

The drawings show, in graphic and quantitative form, the extent, configuration, location, relationships, and dimensions of the work to be done. They generally contain site and building plans, elevations, sections, details, diagrams, and schedules. In addition to drawn information, they may include photographs, other imported graphics, and printed schedules. Architectural, structural, mechanical, electrical, civil, landscape, interior design, and other applicable specialty drawings should be included.

The specifications outline the levels of quality and the standards to be met in the construction of the process. Addenda include additional information that is not covered by drawings or specifications. The set of construction documents should communicate to the contractor the quantities, qualities, and configuration of the elements required to construct a project.”

The construction set should address all the deficiencies and requirements identified by the Organizers in the design development set review. If the construction drawings and submittals are satisfactory, a team will receive Final Approval. Any lingering deficiencies and requirements must be addressed, and revised construction drawings and submittals must be sent to and reviewed by the Organizers before final approval can be granted. Teams that do not receive final approval may be asked to withdraw from the Competition.

3. **As-Built Drawings and Submittals (due August 9, 2005):** The following is a description of as-built drawings and submittals from [H-K Resources Pte Ltd](#).

“As-Built Drawings depict the final installed configuration (whether physical or functional). They indicate any construction deviations and show all features of the project as actually built. These drawings provide a permanent record of as-built conditions and aid as key references for future maintenance processes.”

The as-built set will be distributed to the Architecture Jury and the panel of engineering judges for their Contest 3: Documentation —As-Built Drawings and Submittals evaluations. Inspectors at the Event will also use this set to help them perform their inspections.

## Minimum Content Requirements

The **drawings** must include the following:

- *Site Plan:* Placement of house on its lot and locations of car, water tanks, walkways, signs, etc.
- *Architectural:* Plans, elevations, sections.
- *Structural:* See [Regulation 10.3.3: Structural](#) for detailed structural requirements.

- *Electrical*: Sufficient detail to size and locate major components with the associated routing of conduit and duct systems for electrical power service and distribution, PV systems, lighting, data communication, lighting protection, ground fault protection, and data acquisition and control systems. Includes one-line diagrams. Also demonstrate compliance with *Battery Codes, Regulations, Best Practices and Contest-Specific Rules for the Solar Decathlon* document, which will be provided in the future.
- *Mechanical and Plumbing*: Sufficient detail to size and locate major components with the associated routing of piping, ducts, and plenums for plumbing, HVAC, and hot water heating systems.
- *Layouts*: Must contain sufficient detail to identify the layout of spaces, systems, furniture, and equipment, including material selections with colors, textures, finishes, etc.
- *ADA Compliance*: Demonstrate compliance with the [Solar Decathlon Accessibility Requirements and Guidelines](#) document.
- *System Schematics*: Solar electric, hot water heating, and other unique or unusual systems.
- *Construction and Assembly Process*: Explains the construction process, specifies the equipment to be used on site to aid the assembly process (e.g., cranes, forklifts), and estimates the time necessary to deliver and construct the house.
- *Disassembly Process*: Explains the disassembly process, specifies the equipment to be used on site to aid the disassembly process (e.g., cranes and forklifts), and estimates the time necessary to disassemble and remove the house from the Mall.
- Other important drawings not included in this list.

The **submittals** must include the following:

- Summary of changes: If there are changes to the drawings and submittals between the design development set and the construction set, provide a summary of those changes with the construction set. If there are changes to the drawings and submittals between the construction set and the as-built set, provide a summary of those changes with the as-built set.
- Structural calculations toward meeting PE Stamp requirements (See [Regulation 10.3.3: Structural](#) for detailed structural requirements).
- Calculations, drawings [to be included in 11 in. X 17 in. (or metric equivalent) set], and discussion of additional structural design issues not relevant to PE Stamp requirements. Examples of Project phases not relevant to PE Stamp requirements, but which may present additional structural design challenges, are the following: fabrication and construction; transportation to and from Washington, D.C.; assembly and disassembly; and operation of the house on site at the Event.
- Solar cell specifications
  - Copy of manufacturer's solar cell and module specification sheet(s)
  - Manufacturer's name and contact information
  - Stock number, type, or description
  - Manufacturer's quote for cell or module area
  - Manufacturer's quote for performance
  - Cost (US\$) per watt for each cell or module.

- Battery specifications
  - Copy of manufacturer's battery specification sheet(s)
  - Material Safety Data Sheets (MSDS) obtained from the manufacturer
  - Manufacturer's name and contact information
  - Stock number, type, or description
  - Module voltage (e.g., 6 V, 12 V, or 24 V)
  - Bus voltage
  - Number of modules to be used in the house
  - Manufacturer's specifications, including capacity (kWh), weight (lb.), and cost (US\$)
  - Spill and damage protocols and procedures (if these are not provided in the MSDS, the team must obtain this information from the manufacturer and submit it with the MSDS).
- Information demonstrating compliance with all applicable codes, Solar Decathlon Rules and Regulations, and construction industry standards that is not clearly evident in the actual drawings (e.g., calculations showing that the battery enclosure ventilation is sufficient to maintain compliant hydrogen concentrations). Include a summary of unlisted electrical components and justifications for choosing unlisted components.
- Manufacturers' data sheets for all major house components including, but not limited to, kitchen appliances, hot water heating system components, water supply system components, solar electric balance of system components, HVAC system components, thermal storage devices and tanks, primary structural components, insulation, windows, and unusual finishes, fixtures, and furnishings.
- Material Safety Data Sheets (MSDS).
- Schedules of house components and equipment, including manufacturer, model or part number, and relevant technical specifications.
- Total estimated water usage during the Event; the Organizers need to know how much water is required to meet all the houses' needs during the Event.
- Any other important supplemental information not included in this list.

Note: Some information listed under the submittals requirements may be more appropriately located in the drawings as notes or tables. It is up to the teams to decide whether information belongs in the drawings or submittals. The Jury and panel of engineering judges will evaluate how well the teams organize the information in the drawings and submittals.

## **Format Requirements**

- Drawings must be 11 in. X 17 in. (or metric equivalent).
- Submittals must be 8.5 in. X 11 in. (or metric equivalent).

- There are no page number limits. The Architecture Jury and Engineering Panel of Judges will determine whether an appropriate amount of information has been conveyed in the Drawings and Submittals.
- Spiral bindings are required for both the drawings and supplements.
- The Panel of Judges for the As-Built Drawings and Submittals Contest Activity will evaluate both sets. The Organizers will use both sets to determine conditional and final approval.
- Five hard copies of the design development and construction drawings and submittals sets are required. Fifteen hard copies of the as-built drawings and submittals are required because they must be distributed to all the judges. In addition to the hard copies, electronic files of the entire 11 in. X 17 in. (or metric equivalent) drawings are also required. The electronic files must meet the following requirements. If they do not meet these requirements, they will not be used in any brochures, signs, programs, or other promotional materials:
  - Images must be 11 in. X 17 in. (or metric equivalent) at 300 dpi.
  - TIF files are preferable, but EPS or Adobe Illustrator (Version 5.5 or higher) files are also acceptable. AutoCad or similar files will not be accepted.
  - Mac platform files are preferable, but PC platform files are also acceptable. Although problems with PC platform files are rare, they do sometimes occur, so if you want to make sure the Organizers can access your files, you should consider Mac platform files.
  - Files must be in RGB, 8-bit color.
  - Only compressed files using Stuffit or ZIP software will be accepted.
- A standard architectural title block must appear on the right side of every page of the drawing set. The title block may be toward the top, middle, or bottom of the page, but it must be placed on the right side.
- The scale of all plans, elevations and sections must be 0.25 in. = 1ft-0 in. (or metric equivalent). However, a graphic scale must be used so that the drawing can be reduced or enlarged without consequence.
- Construction details should be at an appropriate scale.
- There must be a 0.5 in. (or metric equivalent) margin around the entire page.
- Refer to *The Architect's Handbook of Professional Practice: Student Edition* for suggested drawing conventions regarding page numbers, text heights, layers, dimensions, symbols, specifications, etc.
- The cover sheet of the drawings set must contain the following information:
  - Title
  - Floor plan
  - Site plan, i.e., location relative to other houses
  - Image of house exterior (can be a photo or computer rendering)
  - 250-word mission statement, which will be used as quick reference by the Architecture Jury and the Dwelling Panel in their evaluations.

- Send the Drawings and Submittals package to the following address:  
Mike Wassmer  
National Renewable Energy Laboratory  
Mail Stop 3214  
1617 Cole Blvd.  
Golden, CO 80401

#### **Summary of Revisions**

March 12, 2004

- Added bullet about page number limit
- Under bullet regarding information about compliance, added requirement regarding unlisted electrical components
- Activated link to *Solar Decathlon Accessibility Requirements and Guidelines* document
- Added mailing address to which Drawings and Submittals should be sent